

REMARKS

Reconsideration and allowance of the above-identified application are respectfully requested. Claims 25 and 28-40 are currently pending.

Rejections Under 35 U.S.C. §102

Claims 25 and 26 have been rejected under 35 U.S.C. §102(a) as being anticipated by Li et al. (5,772,771). Li et al. describes a deposition chamber having a center nozzle 56 with a single central orifice 64 (see column 3, lines 59-63). Li et al. also describes the use of multiple center nozzles 56a illustrated in FIG. 1A (column 5, lines 19-23). Li et al. also mentions replacing the nozzle 56 with a shower head with multiple exists (column 5, lines 33-34).

Claim 25 as amended recites a center gas outlet extending in the axial direction and a plurality of angled gas outlets. Li et al. describes either a center axial outlet or a plurality of angled outlets. There is no teaching or suggestion in Li et al. of a gas injector nozzle with an axial center gas outlet and a plurality of angled gas outlets. As such, Li et al. clearly fails to teach or suggest the invention of Claim 25.

Claims 25, 26, 29, 33, and 34 have been rejected under 35 U.S.C. §102(a) as being anticipated by Ishii (5,685,942). As shown in FIG. 4 of Ishii a hollow portion 86 is provided with a plurality of supply ports 87. However, as illustrated in FIG. 4 of Ishii, each of the supply ports 87 are axially arranged. Accordingly, Ishii does not teach or suggest a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction as recited in Claim 25. For at least this reason, the rejection based on Ishii should be withdrawn.

Claims 25-28, 30-32, and 35 have been rejected under 35 U.S.C. §102(e) as being anticipated by McMillin et al. (6,013,155). McMillin et al. describes a gas injection system including several different embodiments of shower head nozzles. Of particular interest, is FIG. 19B which illustrates a nozzle having an axial outlet 258 and angled outlets 254. However, in McMillin et al. the axial outlets are in the sides of the nozzle rather than the distal end as recited in Claim 25.

Accordingly, McMillin et al. does not teach or suggest gas outlets including a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction wherein the gas outlets are located in an axial end surface of gas injector body.

Rejection Under 35 U.S.C. §103

Claim 36 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Ishii in view of McMillin et al. As described above, Ishii and McMillin et al., either alone or in combination, do not teach or suggest an axial distal end surface of the gas injector body having both a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction. Accordingly, the combination of Ishii and McMillin et al. does not teach or suggest the present invention.

New Claim 39 and 40

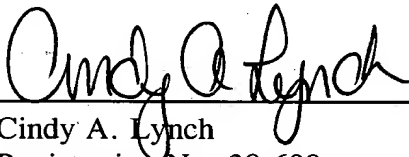
New Claim 39 recites a gas injector including an annular flange adapted to overlie and contact an outer surface of the chamber wall and a first O-ring seal in a surface of the flange for sealing against the outer surface of the chamber wall. The Office Action states that McMillin et al. teaches at least one O-ring seal (157, column 16, lines 11-30). However, the O-ring seal described in McMillin et al. is on the external surface of the nozzle 250 and not on a flange. Thus, the combination of Ishii and McMillin et al. would result in the nozzle of Ishii with an O-ring seal on an exterior surface and not an O-ring on in a surface of a flange for sealing against the outer surface of the chamber wall as claimed. Accordingly, new Claim 39 is allowable.

New Claim 40 recites a second O-ring seal. The combination of Ishii and McMillin et al. clearly does not teach or suggest the first and second O-ring seals as claimed. For this additional reason, Claim 40 is allowable.

Reconsideration and allowance are urgently solicited. In the event that there are any questions concerning this Amendment or the application in general, the Examiner is respectfully urged to telephone the undersigned attorney so that prosecution may be expedited.

Respectfully submitted,

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Date: December 9, 2002

CLAIMS AS AMENDED

25. (Amended) A gas injector for supplying process gas to a plasma processing chamber wherein a semiconductor substrate is subjected to plasma processing, the gas injector comprising:

gas injector body sized to extend through a chamber wall of the processing chamber such that [a] an axial distal end surface of the gas injector body is exposed within the processing chamber, the gas injector body including a plurality of gas outlets adapted to supply process gas into the processing chamber, the gas outlets including a center gas outlet extending in the axial direction and a plurality of angled gas outlets extending at an acute angle to the axial direction, wherein the gas outlets are located in the axial distal end surface of the gas injector body.